

REMARKS

This Amendment responds to the Final Office Action mailed June 23, 2010, in the above-identified application. The foregoing amendments do not raise new issues or require extensive consideration. Accordingly, entry of the Amendment and allowance of the application are respectfully requested.

Claims 1-37 are pending in the application. Claim 11-20 and 22-36 have been withdrawn from consideration. Accordingly, claims 1-10, 21 and 37 are currently under consideration. By this Amendment, independent claims 1, 10, 21 and 37 have been amended for clarification. No new matter has been added.

The Examiner has rejected claims 1-5, 8, 10, 21 and 37 under 35 U.S.C. §103(a) as unpatentable over MacAulay (US 6,483,641) in view of Holzbach (US 6,795,241) and Anderson (US 6,614,581). Claim 6 is rejected under 35 U.S.C. §103(a) as unpatentable over MacAulay in view of Holzbach and Anderson, further in view of Moranski et al (US 6,094,289). Claim 7 is rejected under 35 U.S.C. §103(a) as unpatentable over MacAulay in view of Holzbach and Anderson, further in view of Sun (US 6,415,068). Claim 9 is rejected under 35 U.S.C. §103(a) as unpatentable over MacAulay in view of Holzbach and Anderson, further in view of Hosoi (US 6,400,490). The rejections are respectfully traversed for the following reasons.

MacAulay discloses microscopes that control the light that contacts a sample and/or is detected emanating from a sample. The control includes selective control of the angle of illumination, the quantity of light and the location of light reaching the sample and/or a detector. One or more spatial light modulators are placed in the illumination and/or detection light path of the microscope at one or both of the conjugate image plane of the aperture diaphragm of the objective lens and the conjugate image plane of the sample (col. 2, lines 54-64). As shown in FIG. 3A of MacAulay, a digital micromirror device 34 is positioned between a sample 20 and a light detector 26. MacAulay teaches that the change in angle of illumination made possible by such microscopes permits the determination of 3-D images of the sample. For example, the sample can be illuminated from a plurality of different angles and then the changes in intensity in the light impinging on the individual pixels in the detection array can be detected and then

combined, compiled and/or reconstructed by a controller to provide a 3-D image of the sample (col. 22, lines 40-47).

MacAulay describes the spatial light modulator with reference to FIG. 2A. Individual micromirrors of a digital micromirror device are tilted “on” toward an image plane 40 or are tilted “off” toward a beam stop 37 (col. 16, lines 36-55). As shown in FIG. 2C, the time “on” and time “off” of each digital micromirror can be controlled between 100% on and 100% off to effect light modulation (col. 16, line 62 to col. 17, line 9). The angles of illumination and detection are controlled by controlling the “on” and “off” positions of the micromirrors in different areas of the micromirror device.

Holzbach describes a system and method to form a large scale full parallax three-dimensional electronic display (Abstract). The 3-D electronic display includes a plurality of lenslet pixel modules and a plurality of two-dimensional moving image sources (col. 2, lines 5-8 and col. 12, lines 43-56).

Anderson discloses a microstructure, such as a micromirror, that is moveable between a plurality of tilt positions (col. 5, line 50 to col. 6, line 2). An embodiment having five tilt positions is shown in FIGs. 2 and 3A-3E of Anderson (col. 7, lines 32-57).

In the Response to Arguments section of the Office Action, the Examiner notes the MacAulay teaching that the “modulator controller selects a plurality of desired angles of illumination of the sample such that the plurality of images of the sample at a corresponding plurality of different depths are obtained without moving the sample, a condenser lens, or an objective lens” (col. 4, lines 47-51). The Examiner then asserts that MacAulay does not expressly teach a structure of a spatial light modulator capable of changing the angles of light. Applicant must respectfully disagree. Applicant contends that MacAulay does in fact teach a spatial light modulator capable of changing the angles of light and further contends that the micromirrors of Anderson are incompatible with the microscope described by MacAulay. The reasons are discussed below.

It is submitted that a skilled person would readily understand from the teachings of MacAulay how the spatial light modulator changes the angles of light. As described in connection with FIG. 2A, each micromirror 42 may be tilted “on” toward an image plane 40 or

may be tilted “off” toward a beam stop 37 (col. 16, lines 36-55). A first angle is achieved, for example, by turning “on” a micromirror at the top of micromirror device 34, causing light to travel toward image plane 40 along the light ray at the top of FIG. 2C. A second angle can be obtained by turning “on” a micromirror at the bottom of FIG. 2C, causing light to travel toward image plane 40 along the light ray at the bottom of FIG. 2C. Thus, different angles of illumination and/or detection are achieved by turning on different micromirrors in different areas of micromirror device 34. In the example of FIG. 2C of MacAulay, the angle of light can be changed by reversing the micromirrors that are “on” and “off” from top to bottom.

From the above explanation, it should be apparent that MacAulay changes angles of light by activating different micromirrors in different areas of micromirror device 34. However, MacAulay does not teach a micromirror device wherein each individual micromirror is capable of changing the angle of light, except to the extent of being turned “on” or “off.”

By contrast, amended claim 1 recites *each light path selection element of said plurality of light path selection elements being configured to select the different incoming angles of light to come to said light receiving elements at different times to record different images at the different incoming angles of light*. As described above, the spatial light modulator of MacAulay is not configured such that each individual micromirror selects different incoming angles of light at different times to record different images at the different incoming angles of light, as claimed. Therefore, the claimed three-dimensional image pickup apparatus differs significantly from the microscopes described by MacAulay.

Applicant respectfully submits that the combination of MacAulay with Anderson is improper and should be withdrawn. In particular, Applicant submits that modifying the micromirrors of micromirror device 34 of MacAulay to reflect at a plurality of angles, as taught by Anderson, would render the microscope of MacAulay inoperative. If the multiple angle micromirror of Anderson was used in the microscope of MacAulay, light from source 4 of MacAulay would be incident on sample 20 at only one angle of the micromirrors, which corresponds to the “on” position taught by MacAulay. At other angles of the plurality of angles, light from source 4 would be reflected at different angles and would not be incident on sample 20. Similarly, light emanating from sample 20 would be incident on detector 26 at only one

angle of the micromirrors corresponding to the “on” position taught by MacAulay. At other angles of the plurality of angles, the light emanating from sample 20 would be reflected at different angles and would not be incident on detector 26. Thus, contrary to the assertion of the Examiner, the Anderson micromirrors would render the MacAulay microscope inoperative.

It is submitted that the person of skill in the art would recognize that the asserted combination of Anderson with MacAulay would result in an inoperative device and therefore would not combine the teachings of MacAulay and Anderson. In particular, the skilled person would recognize that MacAulay teaches a spatial light modulator wherein micromirrors in different areas of the micromirror device are turned on or off for different amounts of time to achieve spatial light modulation. By contrast, Anderson teaches a micromirror device wherein each individual micromirror of the micromirror device is capable of directing light in a plurality of different directions. The two micromirror devices operate differently and are not interchangeable in the microscope of MacAulay.

For at least these reasons, it is submitted that a reasonable expectation of success, required in making a combination of references, is absent in the asserted combination of MacAulay, Anderson and Holzbach. Accordingly, it is submitted that the combination of references is improper and should be withdrawn.

For at least these reasons, amended claim 1 is clearly and patentably distinguished over MacAulay in view of Holzbach and Anderson. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 2-9 depend from claim 1 and are patentable over the cited references for at least the same reasons as claim 1.

Amended claim 10 is directed to a three-dimensional image pickup apparatus comprising, in part, incoming angle acquisition means for acquiring corresponding incoming angle information of the received light at different incoming angles and at different times, said incoming angle acquisition means comprising a plurality of light path selection elements, *each light path selection element of said plurality of light path selection elements being configured to select different incoming angles of light to come to said light intensity acquisition means at different times.*

As should be apparent from the above discussion, the combination of MacAulay, Holzbach and Anderson does not teach a three-dimensional image pickup apparatus as required by claim 10. For at least these reasons and the reasons discussed above, amended claim 10 is clearly and patentably distinguished over MacAulay in view of Holzbach and Anderson. Accordingly, withdrawal of the rejection is respectfully requested.

Claim 37 is directed to an information recording method and contains method limitations that parallel the apparatus limitations of claim 10. As should be apparent from the above discussion, claim 37 is clearly and patentably distinguished over MacAulay in view of Holzbach in view of Anderson. Accordingly, withdrawal of the rejection is respectfully requested.

Claim 21 is directed to a three-dimensional image pickup and display apparatus comprising a light reception section and a light emission section. The light reception section includes a plurality of light receiving elements and a plurality of first light path selection elements for selecting different incoming angles of light to come to said light receiving elements at different times, *each first light path selection element of said plurality of first light path selection elements being configured to select different incoming angles of light to come to said light receiving elements at different times.* The light emission section includes a plurality of light emitting elements and a plurality of second light path selection elements for selecting corresponding different outgoing angles of light to be emitted from said light emitting elements at different times, *each second light path selection element of said plurality of second light path selection elements being configured to select different outgoing angles of light to be emitted from said light emitting elements at different times.*

As should be apparent from the above discussion, the combination of MacAulay, Holzbach and Anderson does not teach or suggest a three-dimensional image pickup and display apparatus as defined by amended claim 21. For at least these reasons and the reasons discussed above, amended claim 21 is clearly and patentably distinguished over MacAulay in view of Holzbach and Anderson. Accordingly, withdrawal of the rejection is respectfully requested.

Based upon the above discussion, claims 1-10, 21 and 37 are in condition for allowance.

CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. S1459.70077US00 from which the undersigned is authorized to draw.

Dated: August 17, 2010

Respectfully submitted,

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